April 12, 1932. A. CURIONI 1,853,961

NEEDLING APPARATUS

Filed Dec. 13, 1929 3 Sheets-Sheet 1

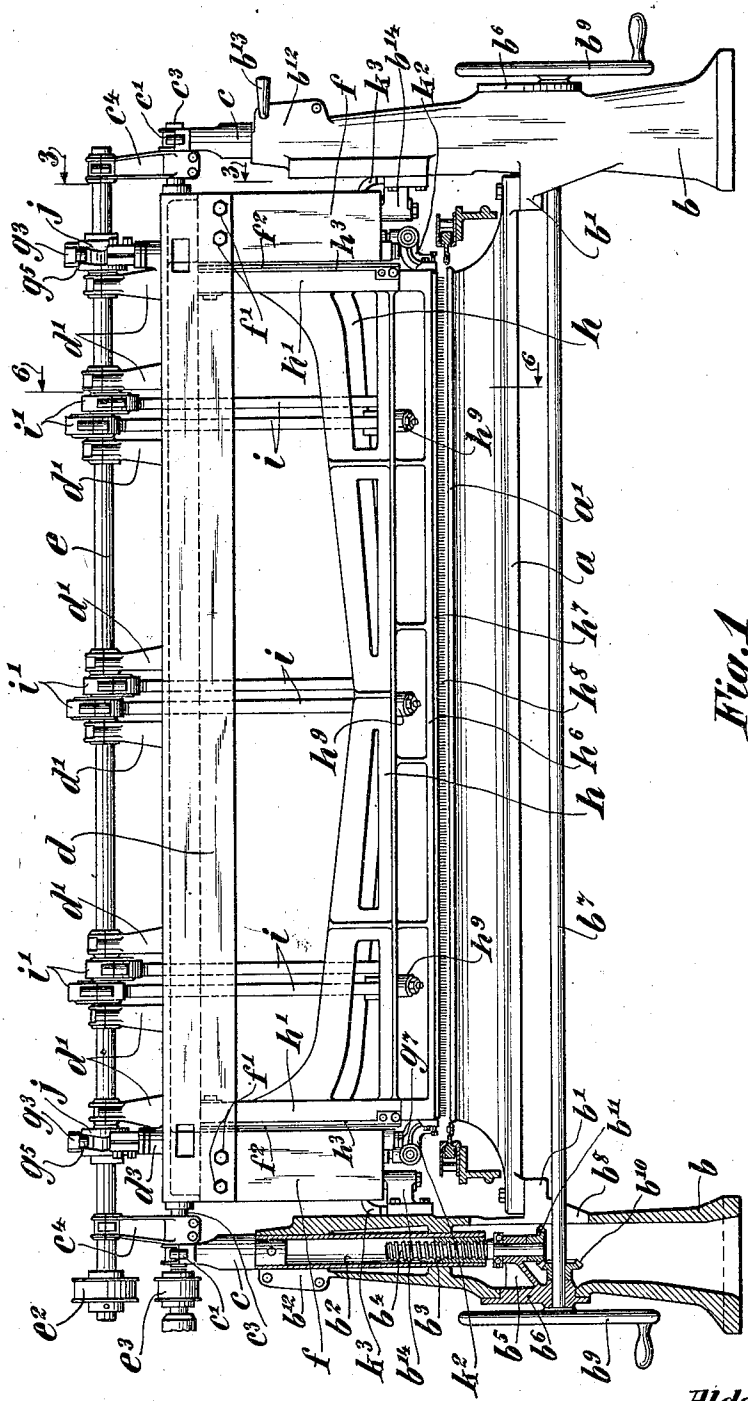

Fig. 1

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NEEDLING APPARATUS

Filed Dec. 13, 1929 3 Sheets-Sheet 2

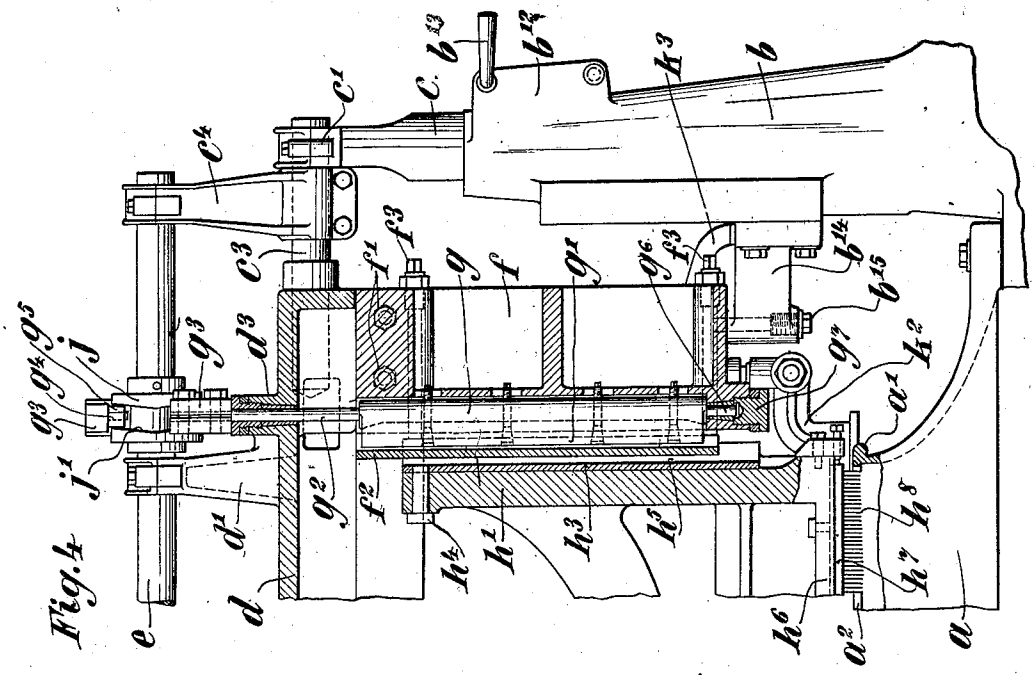

Fig. 4

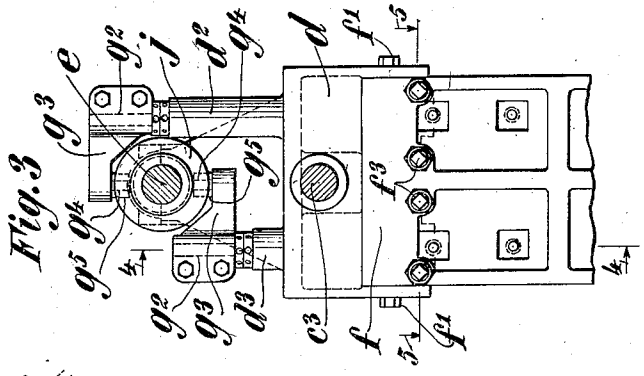

Fig. 3

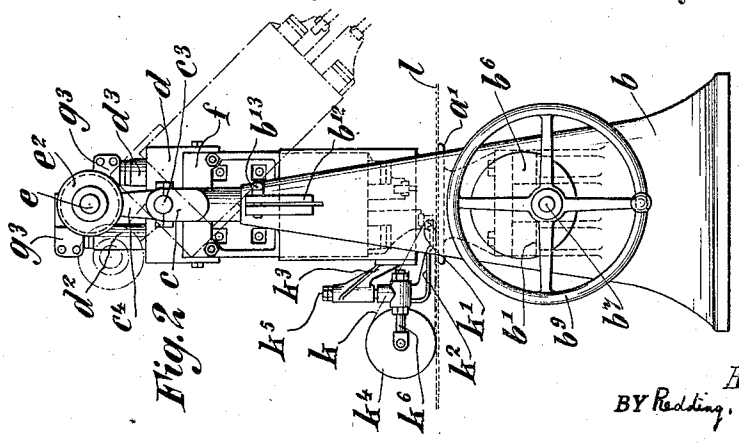

Fig. 2

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NEEDLING APPARATUS

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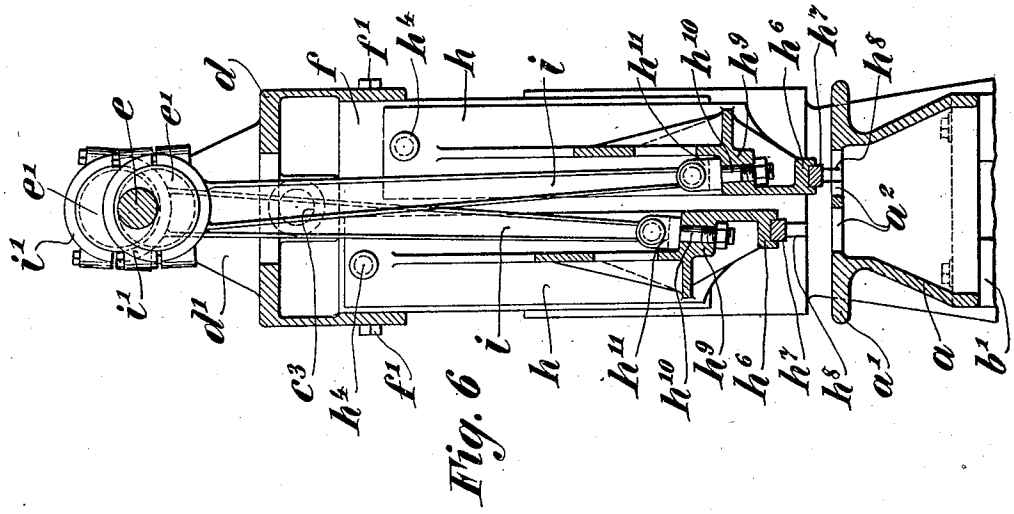

Fig. 6

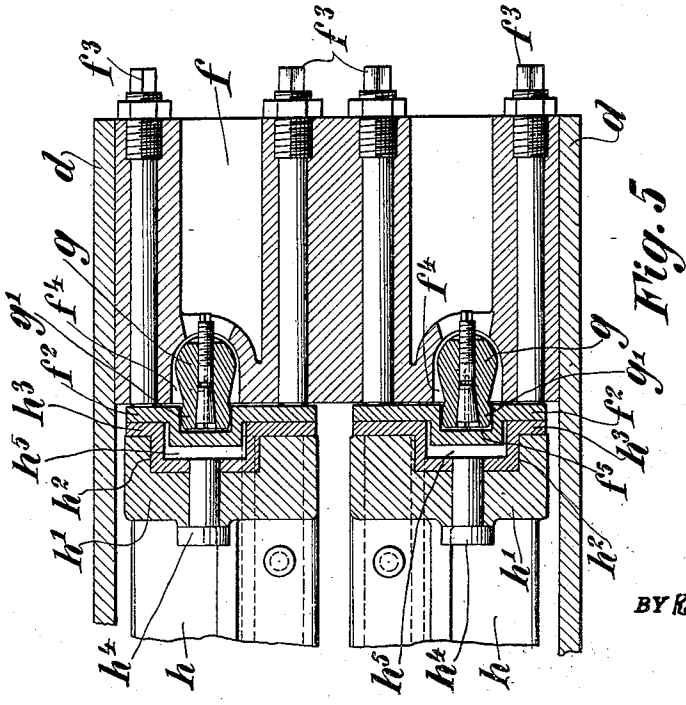

Fig. 5

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Patented Apr. 12, 1932 1,853,961

UNITED STATES PATENT OFFICE

ALDO CURIONI, OF LARCHMONT, NEW YORK, ASSIGNOR TO CURIONI BROS. INC., A CORPORATION OF NEW YORK

NEEDLING APPARATUS

Application filed December 13, 1929. Serial No. 413,695.

The present invention relates to apparatus for manufacturing fabric and embodies, more specifically, an improved device, commonly called a needling machine, for working suitable fabric and causing it to have a desired characteristic.

More particularly the invention concerns itself with a machine for producing a nap, or surface, upon a fabric to simulate the appearance and characteristics of certain desired materials. It is contemplated, for example, to produce, upon a suitable base, a finish which may have the appearance and characteristics of soft woolen goods, flannel, etc., the base constituting a material of inferior quality or grade, thus materially reducing the expense of the finished product.

Devices have been provided for applying a suitable finish to fabrics of inferior grade, for instance canvas, ticking, etc. which simulates that of expensive fabrics, for instance, soft woolen articles, etc. These devices have enjoyed only a limited use since they have involved difficult and expensive operations which have seriously retarded the commercial productivity of the resulting fabric, thus causing the cost thereof to approximate the cost of the goods simulated so closely as not to justify the marketing of the imitating goods. Utilizing the fundamental principle of applying a suitable finish to an inferior fabric, the present invention carries the manufacturing thereof forward to such an extent that the resulting product can be manufactured inexpensively and quickly, thus drawing the process involved into that class of industry which requires and offers an enormous and rapid output at a comparatively inexpensive figure to justify quantity production at minimum overhead.

An object of the invention, accordingly, is to provide an apparatus of the above character which applies a suitable finish to a fabric base, the operation progressing continuously and effectively with a minimum amount of manual supervision.

A further object of the invention is to provide a device of the above character in which the fabric base is worked continuously and rapidly, the operation thereof being controlled through mechanism which is readily constructed and serviced.

Further objects, not specifically enumerated above, will be apparent as the invention is described in greater detail in connection with the accompanying drawings, wherein:

Figure 1 is a view in front elevation, partly in section, and showing the device constructed in accordance with the present invention.

Figure 2 is a view in end elevation, taken from the left in Figure 1, and showing the device of Figure 1.

Figure 3 is a view in section, taken on line 3—3 of Figure 1, and looking in the direction of the arrows.

Figure 4 is a view in section, taken on line 4—4 of Figure 3, and looking in the direction of the arrows.

Figure 5 is a view in section, taken on line 5—5 of Figure 3, and looking in the direction of the arrows.

Figure 6 is a view in section, taken on line 6—6 of Figure 1, and looking in the direction of the arrows.

Referring to the above drawings, a designates the bed plate or horizontal working table of a machine for producing a desired finish upon a desired base in accordance with the present invention. This bed plate is mounted upon supporting brackets b' formed upon vertical end standards b. These end standards are preferably hollow and slidably mount sleeves b^2 within the lower extremities of which nuts b^3 are secured. These nuts are threaded to receive elevating worm shafts b^4, journaled in inwardly extending brackets b^5 which are formed upon closure plates b^6 carried by the standards b. A horizontal shaft b^7 is journaled in the closure members b^6 of the standards and extends across the machine under the bed plate a. Suitable apertures b^8 are formed in the adjacent sides of the standards b to receive the longitudinal shaft b^7, manually operable wheels b^9 being secured to the ends of shaft b^7 to enable the mechanism to be elevated as desired. Bevel pinions b^{10} are mounted upon the shaft b^7 and engage cooperating pinions b^{11} upon the lower extremities of the elevating worms

b^4. In this manner, it will be readily apparent that the sleeves b^2 may be elevated or lowered simultaneously to a desired amount. A split section b^{12} is preferably formed at the top of the standards and operated by a manual crank b^{13} in a well known manner to lock the sleeves b^2 in a desired position.

Heads c are secured to the upper ends of sleeves b^2 and provide journals c' within which pivot shafts c^3 are mounted. These pivot shafts are secured to the opposite ends of a head d which preferably carries the needling mechanism as hereinafter described.

Vertically extending brackets d' are formed upon the head d and spaced at suitable intervals to afford bearings for a crank shaft e, such bearings preferably being spaced in pairs as clearly shown in Figure 1. Between each pair of brackets d', eccentrics e' are mounted upon shaft e. The throws of the respective eccentrics of each pair are preferably 180° apart, thus causing the crank arm of one eccentric of each pair to be diamerically opposite to the crank arm of the other eccentric of each pair. This relationship is clearly shown in Figure 6.

Brackets c^4 are mounted upon the pivot shafts c^3 and receive the ends of crank shaft e, a pulley e^2 being mounted at one end of the crank shaft to be driven by a driving pulley e^3, the axis of which preferably coincides with the axis of the pivot shafts c^3. Power from any suitable source may be supplied to the driving pulley e^3 and thus supply the necessary motive power to crank shaft e.

Depending from head d at opposite ends thereof are guides f. These guides may be secured to the head by means of bolts f' and carry pairs of guide tracks f^2 which may be positioned with respect to the guides by means of bolts f^3. Spaced vertical recesses or grooves f^4 are formed in the guides f and receive oscillating shafts g, described more fully hereinafter. Guide tracks f^2 are formed with grooves f^5 which cooperate with keys g' upon shafts g to transmit the oscillatory motion of shafts g to the tracks f^2.

In the form of mechanism in which the present invention has been embodied, two reciprocating tool heads h are utilized. The heads are similar in construction and formed with spaced lateral sides h' which are recessed at h^2 and upon which guide plates h^3 are secured by means of bolts h^4. The plates h^3 are recessed at h^5 to receive the projecting rib of the guide shoes f^2, thus transmitting the oscillating movement of the shafts g to the movable heads h. Jaws h^6 are formed on the lower extremities of the heads h and receive tool carriers h^7 which may be provided with a plurality of needles h^8, the needles of the respective heads being preferably staggered in order that their work upon the fabric base may be uniformly distributed over the area of the latter.

Shoulders h^9 are formed on each movable head and receive bolts h^{10} upon which yoke-shaped bearings h^{11} are formed. Connecting rods i are secured to the bearings h^{11} and mounted, at their upper extremities, over the respective eccentrics e' by suitable eccentric straps i'. In this manner, the rotation of crank shaft e is transmitted to the heads h to impart reciprocating motion to the latter. Since the throws of the eccentrics are diametrically opposed, one head will be moved upwardly while the other is moving downwardly, thus alternately engaging the work as it passes over the work table or bench a.

Adjacent the extremities of crank shaft e, collars j are mounted. These collars are formed with cam tracks j' and rotate with the crank shaft. Shafts g are connected to extending shaft sections g^2 which are journaled in suitable extensions d^2 and d^3, formed upon the head d. Extension d^3 is shorter than the extension d^2 and its shaft section g^2 is correspondingly shorter. Mounted upon the upper extremities of the shaft sections g^2 are crank arms g^3 having fingers g^4 provided with rollers g^5. The arms g^3 for the respective shafts g^2 are similar in construction but spaced upon opposite sides of the collars j, the rollers g^5 engaging the cam groove j' as will be readily seen from Figures 1, 3, and 4. By means of the above connection, therefore, it will be seen that the rotation of shaft e is transmitted to the shafts g in the form of oscillatory motion, this motion being imparted to the movable heads h to cause the latter to be advanced and retracted periodically in a plane perpendicular to the vertical longitudinal plane of the machine. This motion causes the movable heads to be advanced with the fabric base upon which they work and thus enable the needles to engage the base as the latter moves.

The bed plate a is formed with a horizontal table a' within which slots a^2 are formed. As the needles h^8 are depressed to engage the fabric, they are received within the slots a^2 and thus enjoy an unobstructed path of movement.

The reaction of shafts g may be taken, at the lower extremities thereof, by stub shafts g^6 which are preferably journaled in the lower extremity of the respective guides f. Suitable adjusting mechanism g^7 may be provided and the guides may be held in operative position by means of brackets b^{14} which are secured to the standards b. Lock pins b^{15} are carried by the brackets b^{14} and engage the guides to lock them in the desired position.

In order that the fabric base may be held against the work table a' to permit the ready withdrawal of the needles h^8 therefrom a guide belt k is provided. This belt is preferably mounted over a roller k' which is

journaled upon brackets k^2 carried by the standards b. A second bracket k^3 mounts roller k^4 to permit the tension and position of belt k to be readily adjusted. The mechanism for accomplishing this will be readily apparent from an inspection of Figure 2, wherein the adjustable shafts k^5 and k^6 are shown supporting the roller k^4.

From the foregoing, it will be seen that the operation of the machine is as follows. With power being suplied to the driving pulley e^3, crank shaft e rotates to reciprocate the heads h in vertical planes. Simultaneously with their vertical reciprocation the oscillation of shafts g, derived through cam groove j' and associated connections, is imparted to the movable heads to cause the latter to be advanced and retracted in the direction of and counter to the direction of movement of the fabric base, respectively. As the heads h descend, needles h^8 are driven through the fabric base and moved therewith until the respective heads are moved upwardly during the opposite throw of their respective driving eccentrics which are rotating with shaft e. Upward movement of the heads and needles withdraws the latter from the fabric and permits them to be advanced against the fabric and into the same at its initial starting position.

In Figure 2, a suitable fabric has been indicated at l, in dotted lines and passes under the belt k. Cotton, wool fibres, or any other suitable material may be distributed upon the base as it passes under the belt and thus carried under the descending needles of the respective heads h. As the needles pass through the fabric base they drive such material therethrough and cause it to be lodged in the base, the withdrawal of the needles leaving such material lodged therein. By providing a plurality of heads, each having a suitable number of needles disposed in staggered relationship, the material may be so effectively lodged in the base at a multiplicity of points that the finished product resembles the soft and irregular surface of any desired material. It will be readily understood that the particular material used in connection with the base may be varied as desired to simulate any desired fabric and in view of the fact that the needles advance with the base, the productivity of the machine is very great.

While the invention has been described with specific reference to the accompanying drawings, it is not to be limited, save as defined in the appended claims.

I claim as my invention:

1. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, a plurality of guide tracks carried by each guide, shafts mounted in each guide and having portions engaging the respective tracks, a plurality of needle carrying heads slidably mounted in spaced tracks of the respective guides, a crank shaft carried by the guides, means to reciprocate the heads from the crank shaft alternately, clearances in the work table to receive the needles, means to oscillate the first shafts from the crank shaft, and an endless belt on the frame to prevent material on the tables from following the needles in their upward strokes.

2. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, a plurality of guide tracks carried by each guide, shafts mounted in each guide and having portions engaging the respective tracks, a plurality of needle carrying heads slidably mounted in spaced tracks of the respective guides, a crank shaft carried by the guides, means to reciprocate the heads from the crank shaft alternately, clearances in the work table to receive the needles, means to oscillate the first shafts from the crank shaft, and means to prevent material on the table from the following the needles in their upward strokes.

3. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, a plurality of guide tracks carried by each guide, shafts mounted in each guide and having portions engaging the respective tracks, a plurality of needle carrying heads slidably mounted in spaced tracks of the respective guides, a crank shaft carried by the guides, means to reciprocate the heads from the crank shaft alternately, clearances in the work table to receive the needles, and means to oscillate the first shaft from the crank shaft.

4. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, a plurality of guide tracks carried by each guide, shafts mounted in each guide and having portions engaging the respective tracks, a plurality of needle carrying heads slidably mounted in spaced tracks of the respective guides, a crank shaft carried by the guides, means to reciprocate the heads from the crank shaft, cam grooves spaced at either end of the crank shaft, and cam followers carried by the respective first shafts and engaging the respective grooves on opposite sides thereof.

5. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, a plurality of guide tracks carried by each guide, shafts mounted in each guide and having portions engaging the respective tracks, a plurality of needle carrying heads slidably mounted in spaced tracks of the respective guides, a crank shaft carried by the guides, means to reciprocate the heads from the crank shaft, and means to oscillate the first shafts from the crank shaft.

6. A device of the character described com-

prising a frame, a work table on the frame, vertical guides carried by the frame, guide tracks carried by the guides, shafts mounted in the guides and having portions engaging the tracks a needle carrying head slidably mounted on the tracks, a crank shaft carried by the guides, means connecting the crank shaft with the head to oscillate the latter, cam grooves on the crank shaft, means on the first shafts engaging the grooves to oscillate the said shafts, means to mount the guides pivotally, and means concentric to the mounting to transmit power to the crank shaft.

7. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, guide tracks carried by the guides, shafts mounted in the guides and having portions engaging the tracks, a needle carrying head slidably mounted on the tracks, a crank shaft carried by the guides, means connecting the crank shaft with the head to oscillate the latter, cam grooves on the crank shaft, means on the first shafts engaging the grooves to oscillate the said shafts, and means to mount the guides pivotally.

8. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, guide tracks carried by the guides, shafts mounted in the guides and having portions engaging the tracks, a needle carrying head slidably mounted on the tracks, a crank shaft carried by the guides, means connecting the crank shaft with the head to oscillate the latter, cam grooves on the crank shaft, and means on the first shafts engaging the grooves to oscillate the said shafts.

9. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, guide tracks carried by the guides, shafts mounted in the guides and having portions engaging the tracks, a needle carrying head slidably mounted on the tracks, and means to reciprocate the head and oscillate the shafts.

10. A device of the character described comprising a frame, a work table on the frame, vertical guides carried by the frame, guide tracks carried by the guides, shafts mounted in the guides and having portions engaging the tracks, and means to oscillate the shafts.

11. A device of the character described comprising a frame, a work table on the frame, vertical guide tracks carried by the frame, a head slidably mounted between the guide tracks, means to move the head vertically on the tracks, and means to move the tracks in a horizontal plane.

This specification signed this 12th day of December, A. D. 1929.

ALDO CURIONI.